

CHAPTER I

INTRODUCTION

1.1 Background

Nowadays, the development of constructions projects in Indonesia is rapidly increasing. However, the development of construction projects has to be followed by the development of the quality of the building. The quality of the building is very important in constructions project. One of the important factors that affect the quality of the buildings is soil strength in the construction sites.

Some of construction project in Indonesia are built on the site that consist of clay. Clay is fine grain material that consists of very small particles. Because of its size, clay has small pore than other types of soils. In the construction projects, clay materials considered as bad base-soil material. Clay soils usually cause some problem on the constructions site. Mostly the problem of clay soils is related to bearing capacity, settlement, swelling and shrinkage.

Clay soils behavior is depend on its water content. Its sensitivity to water content alteration is the special characteristic of clay soils. The strength of the clay is highly affected by water content. In order to evaluate the condition of the clay soils, it is required to predict the behavior of the clay. Research about stabilization of the clay with adding stabilizer is usually done in order to increase the quality of the clay soils. The addition of stabilizer is usually intended to reduce the swelling on the clay soils that can reduce the strength. Clay has high plasticity index and swelling potential, so the stabilization is usually done in order to overcome the problems. Research about clay soils stabilization is commonly done with adding

some additive such as lime, cement, cane pulp ash. Nowadays, a research of clay stabilization is still interesting subjects to be observed.

The development of industries in Indonesia brings welfare to its people. In the industrial process, fuel is needed to operate machines. Coal is one of the fuels that commonly used in industrial process. In some cases like in the power plant station (steam energy electric power station), coal is burned to produce electricity through burning process. Coal used as a fuel burning process produce waste residue that called fly ash.

Fly ash is one of the potential wastes as the result of manufacturing industries. Due to the demand of energy uses, the waste from coal burning process becomes increasing. As waste materials, commonly fly ash just dumped or ignored without any use. From the previous research, it is mentioned that using fly ash as additive for soil stabilization can increase the strength of soils. In order to develop fly ash in the better used, it is beneficial to use fly ash as additive for soil stabilization.

Previous research shows that the strength of clay soil is increasing due to the effect of adding fly ash to the clay soils. However, the increasing of the soil strength is not very significant. Fly ash is considered as pozzolan materials that is not cementing itself. It is need to combine fly ash with Ca (Calcium) rich materials to obtain the better results. Theoretically, Ca-rich materials such as lime and cement combined with fly ash can produce the better strength of soils in soil stabilization process. This study is intended to know the effect of lime-fly ash as additive materials for soil stabilization.

1.2. Problem Statement

The sensitivity of the clay regarding to water content is the main problem in constructions sites. This study is done intended to know about:

1. Does soil stabilization using lime-fly ash can increase the shear strength of the clay?
2. What is the best proportion of the lime-fly ash to stabilizing the clay?

1.3. Problem Scope

The study focused on the shear strength characteristic of the clay. Direct shear apparatus will be used to investigate the shear strength of the clay.

1.4. Objective

This study was done in order to:

1. Know the effect of adding lime and fly ash to stabilize the clay.
2. Find the best proportion of fly ash-lime-soil to get the maximum result in stabilization of the clay soil.

The result of this study intended to find the alternative materials that can be used in soil stabilization. This study expected to be useful for technology development, especially in soil stabilization.

1.5. Research Originality

Sensitivity of clay to water content becomes interesting topics to be observed among the researchers. There are many researches about soils stabilization using fly ash. According to the observation that had been done before, it is mentioned that the stabilization of the clay with fly ash can increase the strength of soils. Fly ash is categorized as pozzolan that needs to be combined with Ca-rich materials to get better result in soil stabilizations. According to the author's knowledge the study about the shear strength of lime-fly ash stabilized clay using direct shear has not been executed by other researchers.